Preventing pressure ulcers in long-term care: a cost-effectiveness analysis


Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
The study assessed the cost-effectiveness of different strategies to prevent pressure ulcers in elderly people in long-term care facilities. The authors concluded that, compared with conventional care, a strategy based on pressure-distribution mattresses was cost-effective. Improving prevention with perineal foam cleaner and dry skin emollients was likely to be cost-effective, although the available evidence was limited. The authors used valid and transparent methods that enhance the robustness of their conclusions.

Type of economic evaluation
Cost-utility analysis

Study objective
The cost-effectiveness of various strategies for the prevention of pressure ulcers was assessed for elderly people in long-term care facilities.

Interventions
Four preventative strategies were assessed: pressure redistribution mattresses for all residents; oral nutritional supplements for high-risk residents with recent weight loss; skin emollients for high-risk residents with dry skin; and foam cleansing for high-risk residents requiring incontinence care.

The comparator was conventional care without any of the preventative systems.

Location/setting
Canada/long-term care facility.

Methods
Analytical approach:
The analysis was based on a validated Markov model with a lifetime horizon. The authors stated that the perspective of a single health care payer was adopted.

Effectiveness data:
Clinical inputs for the model were derived from multiple sources. Specifically, data on the direct effect (the key clinical input of the analysis) of the preventative strategies were based on published randomised controlled trials (RCTs): pressure redistribution mattresses (five RCTs), oral nutritional supplements (four RCTs), skin emollients (one RCT), and foam cleansing (one RCT). Additional data on patient characteristics and some transition probabilities came from the Resident Assessment Instrument - Minimum Data Set (RAI-MDS), which included 89 Canadian facilities and 18,325 residents. Some estimates were from a telephone survey of current prevention practice, administrative databases, and literature reviews.

Monetary benefit and utility valuations:
Utility valuations were estimated from the RAI-MDS database using the health utility index score.

Measure of benefit:
Quality-adjusted life-years (QALYs) were used as the summary benefit measure, discounted at an annual rate of 3%.

Cost data:
Three main sets of costs were included: costs of the preventative strategies under examination; long-term costs associated with routine care (nursing, personal care, food, basic accommodation, and other costs); and costs of managing pressure ulcers, whose severity determined the cost per patient. Most costs were derived from official Ontario sources, including the Ontario Ministry of Health and Long-term Care, the Practice Survey, and the Canadian Institute for Health Information - Discharge Abstract Database. Resource use was taken from the RAI-MDS database and other published sources. Prices of devices and supplies were from manufacturers. Costs were in Canadian dollars (CAD). The price year was 2009. A 3% annual discount rate was applied.

Analysis of uncertainty:
Alternative strategies were analysed by varying the following inputs: excess mortality risk estimate, long-term care perspective, and supply costs only for oral nutritional supplements, skin emollients, and foam cleansing. A probabilistic sensitivity analysis was carried out using conventional probability distributions for model inputs.

Results
For the pressure-redistribution mattress strategy, the incremental cost was −CAD 115 and quality-adjusted life-days 0.31 were compared with standard care.

For the nutritional supplements strategy, the incremental cost was CAD 731 and quality-adjusted life-days were 0.03 compared with standard care.

For the skin emollients strategy, the incremental cost was CAD 24 and quality-adjusted life-days were 0.11 compared with standard care.

For the foam cleansing strategy, the incremental cost was -CAD 179 and quality-adjusted life-days were 0.20 compared with standard care.

The incremental analysis showed that the pressure-redistribution mattress and the foam cleansing strategies were dominant as they were more effective and less expensive than conventional care. The incremental cost per QALY gained over standard care was approximately CAD 7.8 million with the nutritional supplements strategy and CAD 78,286 with the skin emollients strategy.

The sensitivity analysis showed that excluding staff time cost improved the cost-effectiveness of the nutritional supplement strategy, turned the skin emollients strategy into a cost-saving option, and decreased the mean cost saving of the foam cleansing strategy.

At a cost-effectiveness threshold of CAD 50,000 (CAD 100,000) per QALY, the probability of being cost-effective was 94% (96%) for the foam cleansing strategy, 82% (87%) for the pressure-redistribution mattress strategy, 43% (53%) for the skin emollients strategy, and 1% (8%) for the nutritional supplements strategy.

Authors' conclusions
The authors concluded that compared to conventional care, a strategy based on pressure-distributions mattresses was highly cost-effective for the prevention of pressure ulcers in long-term care residents. Improving prevention with perineal foam cleanser and dry skin emollients was likely to be cost-effective although the available evidence was limited.

CRD commentary
Interventions:
The authors justified the selection of the comparators, which were chosen on the basis of available evidence that had previously showed the efficacy of these preventative strategies. Each intervention was compared to current practice (no specific preventive intervention) because the strategies under examination were not mutually exclusive.

Effectiveness/benefits:
Clinical estimates were generally obtained from valid sources known by the authors. The treatment effect was taken from RCTs; a large sample of patients was available for the pressure-redistribution mattress and nutritional supplements strategies (while smaller samples were found for the skin emollients and foam cleansing strategies). The authors stated
that these studies were mainly conducted on patients in acute care and might not be totally representative of long-term care residents. Other data were taken from literature reviews or local databases.

The use of QALYs appeared appropriate given that the disease under analysis can have an impact on mortality (although mainly morbidity) of patients. Utility weights were taken from a large sample of Canadian patients using a valid instrument.

**Costs:**
The cost categories included in the analysis appeared to be consistent with the perspective stated by the authors. Extensive details of unit costs and resource quantities were presented, although some were reported as total costs. Resource use was mainly taken from a large database of Canadian facilities that reflected the study's setting. Conventional sources of economic inputs were used. The price year was explicitly stated, which would allow reflation exercises in other time periods. The impact of some cost categories was tested in the sensitivity analyses. Overall, the economic side of the study was conducted satisfactorily.

**Analysis and results:**
An incremental analysis was appropriately used to combine costs and benefits of each strategy over the conventional one. Appropriate methods were used to deal with uncertainty. The Markov model was presented in an appendix. The study results were clearly presented for all four strategies and for alternative scenarios; they were well illustrated and discussed. The authors compared their results with those of other published studies, but did not explicitly address transferability of the results that might not be relevant for other jurisdictions.

**Concluding remarks:**
The authors used valid and transparent methods that enhance the robustness of their conclusions.

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